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## Art, aesthetics, and the brain

# Liking music: Genres, contextual factors, and individual differences

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## Abstract

Around the world and throughout history, music has been valued and enjoyed. Although individuals often have strong and specific feelings about the music they like or dislike, research on musical appreciation is in its infancy. This chapter discusses factors that are known to influence evaluative responses to music. This chapter's emphasis is on recent research. It first examines preferences for categories of music (i.e. genres). For example, what kinds of people prefer particular genres such as pop or rock? It then discusses contextual factors and individual differences that influence liking for individual pieces of music. By studying when and how people develop music preferences, we can begin to understand the universal appeal of music.

*Keywords:* **, music , liking , personality , emotion , music preferences , individual differences**

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### Introduction

The amount of time and money that people spend on music provides ample evidence that listening to it is important for most of us. We choose to listen to music at concerts, on the radio, and on portable media players (e.g. MP3 players), computers, and CD players. We also hear music that others choose for us in television shows and movies, in shopping centers and restaurants, and at significant events such as weddings and funerals. In 2012, the **International Federation of the Phonographic Industry (2013)** reported that global revenues from digital sales alone (i.e. not including CDs or vinyl) reached

approximately US$5.6 billion, which confirms that music is valued worldwide.

The amount of resources devoted to music consumption establishes unequivocally that at a fundamental level, people *enjoy* listening to music. However, different individuals like different kinds of music, and the same individual may exhibit greater or lesser appreciation for a particular genre or piece of music depending on the circumstances in which it is heard. The goal of this chapter is to provide an overview of research that has examined preferences for genres and liking individual pieces of music.

Over the past few decades, research interest in music perception and cognition has grown (**Jones et al. 2010**), as has interest in emotional responses to music (**Juslin and Sloboda 2010**). Nevertheless, research on liking or disliking music—the most basic emotional response—has received relatively little attention. For example, **Juslin and Västfjäll (2008)** proposed several mechanisms to explain why listeners respond emotionally to music but they did not consider basic liking. Instead they focused on how music evokes emotional responses such as happiness or sadness, ignoring the fact that responding emotionally to music occurs on two levels (**Hunter and Schellenberg 2010**). One is *evaluative*—whether the listener likes the music or considers it to be good. The other level is the specific *feeling*, such as happiness, that is expressed and/or evoked. In the present chapter, our focus is on the evaluative level. What makes someone like a particular song or genre of music? How are individual differences related to music preferences? What factors influence how liking music develops or changes? Our goal is to provide an overview of what is known and unknown in response to these questions, focusing primarily on studies published since 2000.

**(p.264) Liking different genres of music**
Most research on music preferences has focused on characterizing the kinds of people who like different genres of music (e.g. pop, rock, country, rap/hip-hop, classical, jazz, etc.), asking whether individual differences in demographic, cognitive, and personality variables are correlated with how much a person likes particular genres. Although the concept of genre may seem poorly defined, genres can be immediately obvious to the average listener. In one instance, college freshmen registered in a psychology course performed at above-chance levels on a genre-identification task after hearing excerpts of music that were only 250 ms in duration (**Gjerdingen and Perrott 2008**).

Because recognizing and classifying genres can be virtually instantaneous, genres are likely to play an important role in evaluative responses to music. Early research tended to focus on documenting positive associations between preferences for genres, particularly music that sounded aggressive or negative, and personality characteristics such as rebelliousness or sensation seeking (**Arnett 1992**; **Carpentier et al. 2003**; **Cattell and Saunders 1954**; **Christenson and Peterson 1988**; **Dollinger 1993**; **Glasgow et al. 1985**; **Hakanen and Wells 1993**; **Hansen and Hansen 1991**; **Litle and Zuckerman 1986**; **McNamara and Ballard 1999**; **Payne 1980**; **Rawlings and Ciancarelli 1997**; **Rawlings et al. 1995**, **2000**; **Roe 1985**; **Schwartz and Fouts 2003**; **Weaver 1991**; **Wheeler 1985**; see **Rentfrow and McDonald 2010** for a review). More recently, researchers have begun to study associations between genre preferences and personality more comprehensively.

**The structure of music preferences**
**Rentfrow and Gosling's (2003)** research was the first to examine systematically the underlying structure of music preferences and whether these preferences are associated with contemporary personality constructs—the "Big Five" (**McCrae and Costa 1987**). The Big Five considers individual

differences in personality to vary according to five major dimensions: *openness-to-experience*, *conscientiousness*, *extroversion*, *agreeableness*, and *neuroticism* (forming the acronym OCEAN). In a series of studies, Rentfrow and Gosling examined links between genre preferences and the Big Five as well as other personality, demographic, and attitudinal variables. Rather than using judgments made by the researchers to select which music genres to include, a preliminary study established participants' familiarity with various genres and subgenres. The authors used these data to create the Short Test of Music Preferences (STOMP), a list of 14 genres that were familiar to most college students in the United States. The STOMP requires participants to provide a rating from 1 (*dislike strongly*) to 7 (*like strongly*) for each genre. In different samples that comprised thousands of participants from different geographical regions in the USA, Rentfrow and Gosling measured music preferences with the STOMP, as well as by analysing participants' online music libraries. These analyses allowed them to determine (1) whether fans of a particular genre, such as rock, also tend to be fans of other genres, such as alternative or heavy metal; (2) how many truly independent dimensions of preferences there are; and (3) whether liking particular genres varies systematically with other non-musical differences among individuals.

**(p.265)** Principal components analysis revealed four main factors (i.e. latent variables) of music preferences (**Rentfrow and Gosling 2003**). The first, which the authors designated *Reflective and Complex*, represented preferences for classical, jazz, folk, and blues, genres that were also considered to be more musically complex than other kinds of music even though the blues in particular usually has a very simple harmonic structure. In any event, liking these genres was associated positively with openness-to-experience and liberal political views. It was also associated positively with self-reports of intelligence, but negatively with self-reports of athletic ability. The second factor, *Intense and Rebellious*, described preferences for rock, alternative, and heavy-metal music. These preferences were also correlated positively with openness-to-experience and with self-reports of intelligence *and* athletic ability. Fans of *Upbeat and Conventional* genres, which included pop, soundtracks, religious, and country music, tended to be extroverted, agreeable, conscientious, and politically conservative. They also considered themselves to be physically attractive and athletic but they scored low in openness-to-experience. The fourth and final factor, *Energetic and Rhythmic*, reflected preferences for rap/hip-hop, soul/funk, and electronica/dance music. Liking for these genres was correlated positively with extroversion, agreeableness, and political liberalism, and with self-reports of attractiveness and athletic ability.

In a series of follow-up studies, Rentfrow and his colleagues showed that people easily form impressions about fans of different music genres that are stereotypical but are nonetheless often quite accurate (**Rentfrow and Gosling 2006**, **2007**; **Rentfrow et al. 2009**). These findings are consistent with the idea that music preferences are an important part of an individual's identity, and that such preferences can communicate important information about a person's personality, values, and lifestyle (e.g. **North and Hargreaves 1999**). Other research suggests that similarities in music preferences between individuals are considered to reflect a common value system, which in turn provides a basis for social attraction (**Boer et al. 2011**).

In some instances, studies conducted in countries other than the Unites States have found results similar to those of **Rentfrow and Gosling (2003)** concerning the underlying dimensional structure of music preferences. For example, **Langmeyer and colleagues (2012)** replicated and extended Rentfrow and Gosling's results with a sample of young German adults. The results validated the four-factor structure of music preferences using real audio samples of popular songs that exemplified the

relevant genres instead of a paper-and-pencil questionnaire. Nevertheless, results from many other studies differed from the original findings. For example, in another German sample with a wider age range, a six-factor structure was obtained (**Schäfer and Sedlmeier 2009**). In a large sample of Dutch adolescents, moreover, a four-factor structure of music preferences emerged but some genres were attributed to different character traits than in the American samples, specifically those that were either more (techno/trance) or less (gospel) popular in the Netherlands than in the United States (**Delsing et al. 2008**).

In another sample of Dutch adults between 22 and 60 years of age, **Dunn and colleagues (2011)** found that a four-factor structure explained underlying music preferences, but attribution of the individual genres onto the attributes meant that the factors needed to be **(p.266)** defined differently than in the original study (**Rentfrow and Gosling 2003**). One factor represented traditional musical genres (classical, folk, blues, country, religious), another represented harder rock genres (rock, alternative, heavy metal), a third represented genres in which rhythm plays a major role (rap, dance, soul, jazz), and the fourth represented softer rock genres (pop, soundtracks). The fact that a preference for classical and for country music was seen to belong to the same factor is particularly noteworthy, and as one might expect, the diverse nature of jazz music (e.g. Diana Krall and Ornette Coleman are both jazz artists but they sound very different) meant that liking jazz was associated with more than one factor (i.e. also with traditional genres and soft rock).

**Colley (2008)** found that the structure of British undergraduates' music preferences was similar to that of Rentfrow and **Gosling's (2003)** American samples, but with some additional gender differences. Female students exhibited greater liking than male students for Top 40 pop music, but males showed greater liking for hard rock. In a Canadian study, an eight-factor structure emerged when participants provided liking ratings for 30 different genres instead of the 14 from the STOMP (**George et al. 2007**). The sample comprised many undergraduates from a Christian college as well as adults from the surrounding area who also tended to be quite religious. As a consequence, participants provided ratings for four different genres of Christian music, and two of these loaded onto one factor (called *Christian Contemporary*) and two loaded onto a different factor (*Traditional Christian*). The clearest non-musical individual differences were evident for the factors labeled *Rebellious* (alternative, classic rock, grunge, heavy metal, punk), *Rhythmic and Intense* (hip-hop/rap, pop, reggae, rhythm and blues), and *Classical* (choral, classical instrumental, Disney/Broadway tunes, opera/ballet, piano). Greater levels of liking for genres that belonging to the Rebellious or Rhythmic and Intense factors were evident among participants who were younger, under-employed, less educated, and less spiritually minded. These individuals also tended to have poorer social skills, higher levels of neuroticism and hostility, and lower levels of self-esteem, conscientiousness, and agreeableness. People who liked genres that loaded onto the Classical factor showed essentially the opposite pattern.

**Brown (2012)** asked university students in Japan to provide liking ratings for 12 different genres, six of which were taken from the STOMP. Six others were included because they were relatively well known to Japanese listeners. A four-factor structure was revealed that closely resembled **Rentfrow and Gosling's (2003)** original findings, and participants with high scores on openness-to-experience tended to exhibit greater liking for so-called Reflective and Complex music. In another study conducted in Japan, however, the original STOMP led to a four-factor structure but several genres loaded onto factors different from those in the original study (**Oshio 2012**).

Even Rentfrow and his colleagues have found that the dimensional structure of music preferences

differs from the solution they reported initially. In a series of follow-up studies, they asked listeners to provide liking ratings for many (i.e. 25 to 94 depending on the particular study) 15-second excerpts of music taken from unfamiliar recordings that represented 26 different genres (**Rentfrow et al. 2011**). As in the study undertaken by **Langmeyer and colleagues (2012)**, instead of making liking ratings for genre labels, participants made liking **(p.267)** ratings for actual music. A separate group of participants made 14 ratings about each excerpt, seven based on musical descriptors (dense, distorted, electric, fast, instrumental, loud, percussive), and seven based on psychological descriptors (aggressive, complex, inspiring, intelligent, relaxing, romantic, sad). Principal components analysis revealed that liking ratings varied along five distinct dimensions rather than four, which were labeled so that they formed the acronym MUSIC (Mellow, Unpretentious, Sophisticated, Intense, Contemporary).

The authors explained loadings onto the particular dimensions as a function of the different genres and the average ratings for the 14 descriptors (**Rentfrow et al. 2011**). *Mellow* music was judged to sound slow, soft, romantic, relaxing, and non-aggressive, and the excerpts belonged primarily to soft-rock, R&B/soul, and adult-contemporary genres. *Unprententious* music was vocal, non-distorted, soft, non-aggressive, and simple, and the excerpts came from country and bluegrass genres. *Sophisticated* music was non-electric, non-percussive, non-distorted, intelligent, and inspiring, and the excerpts were from recordings of classical and marching-band music. *Intense* music was distorted, loud, electric, aggressive, and non-relaxing, with excerpts coming from rock, punk, and metal genres. Finally, *Contemporary* music sounded electric, percussive, and happy, and the excerpts were primarily from rap, electronica, and Latin genres.

Although the results of the study by **Rentfrow and his colleagues (2011)** revealed that music preferences varied reliably as a function of musical attributes (as measured by the descriptors) and genre membership, genres predicted liking ratings slightly better than attributes. In a follow-up study, however, the same five-factor (MUSIC) solution emerged when *all* of the stimuli were excerpts from jazz music, or all were excerpts from rock music (**Rentfrow et al. 2012**). In these instances, the underlying structure of music preferences was a sole consequence of musical attributes (i.e. differences in how the pieces sounded) rather than genre differences.

Thus, music preferences involve liking for particular musical attributes as well as liking for genres, although music attributes may actually play a larger role. The MUSIC model provides a new foundation for future research that seeks to examine what makes different individuals like different pieces of music. Considered as a whole, though, the available literature suggests that the structure of underlying musical preferences differs across cultures, ages, and historical periods, because different genres are more or less popular with different groups of people. The factors (latent variables) that emerge in principal components analyses also vary depending on which manifest variables (genres) participants are asked to rate, and whether participants rate their liking for genre labels or actual excerpts from recordings. It is also clear that the researchers' own musical preferences influence how the factors that emerge are labeled, such that any dimension associated with classical music may be labeled "complex" or "sophisticated" even though the blues, marching-band, or country music belong to the same factor.

**Genre preferences and individual differences**
Findings from studies of associations between music preferences and personality dimensions are more consistent, particularly for openness-to-experience and extroversion. In **(p.268)** a number of studies, openness-to-experience was associated with preferences for elite or highbrow genres such as

classical and jazz, as well as with intense and rebellious genres such as rock (e.g. **Brown 2012**; **Delsing et al. 2008**; **Dunn et al. 2011**; **George et al. 2007**; **Langmeyer et al. 2012**; **Rentfrow and Gosling 2003**; **Zweigenhaft 2008**). Several studies have also reported links between extroversion and liking genres of music that are considered upbeat and conventional or energetic and rhythmic, including pop, rap/hip-hop, and dance (e.g. **Delsing et al. 2008**; **Langmeyer et al. 2012**; **Rentfrow and Gosling 2003**; **Zweigenhaft 2008**). By contrast, associations between music preferences and the other three dimensions of personality that comprise the Big Five (i.e. agreeableness, conscientiousness, and neuroticism) have been much less consistent (e.g. **Brown 2012**; **Delsing et al. 2008**; **Dunn et al. 2011**; **George et al. 2007**; **Langmeyer et al. 2012**; **Rentfrow and Gosling 2003**; **Zweigenhaft 2008**).

A few recent studies also examined associations between more specific personality facets (rather than broad dimensions) and music preferences (**Dunn et al. 2011**; **Zweigenhaft 2008**). For example, the dimension openness-to-experience comprises six facets: *imagination* (being prone to fantasy), *artistic interests* (appreciating poetry, art, music, and beauty in nature), *emotionality* (awareness of one's own feelings), *adventurousness* (eagerness to try new things), *intellect* (receptiveness to new ideas), and *liberalism* (readiness to challenge authority, convention, and tradition). In principle, future research could delineate personality differences between fans of classical music and fans of rock music, who both have relatively high levels of openness-to-experience. For example, rock fans may be more liberal but classical fans more emotional. More generally, some facets may be better than other facets as predictors of music preferences, and better than broad dimensions as well.

Other scholars have examined associations between music preferences and individual-difference variables other than the Big Five personality dimensions. **Brown (2012)** found that liking classical, jazz, and gospel music was associated with honesty–humility, a trait that includes sincerity, fairness, greed avoidance, and modesty, which some scholars consider to be the sixth broad dimension of personality (**Ashton and Lee 2008**; **Lee and Ashton 2008**). Others have reported that men and women prefer harder and softer styles of popular music, respectively (**Colley 2008**), and that dichotomous thinking (i.e. black-and-white or all-or-none thinking) is associated positively with liking many genres of popular music but negatively with liking classical music, at least among Japanese undergraduates (**Oshio 2012**).

In a more comprehensive approach with a large sample of individuals living in the UK, **North and Hargreaves (2007a**, **2007b**, **2007c)** reported associations between genre-based music preferences and a wide variety of lifestyle variables including income, education, living arrangements, employment, health, leisure interests, and beliefs. Listeners who liked "problem" music (e.g. hip-hop/rap, DJ music, dance/house) tended to hold somewhat anti-social views; although they had liberal social attitudes, they did not have particularly liberal political views in terms of taxation, healthcare, supporting recycling or use of alternative energy sources (**North and Hargreaves 2007a**). In general, fans of opera and classical **(p.269)** music were more likely than other individuals to live a lifestyle associated with the upper-middle and upper classes (with regard to travel, finances, education, employment; **North and Hargreaves 2007c**). They were also more likely to have sophisticated preferences in non-musical domains (e.g. TV and radio, reading, leisure activities; **North and Hargreaves 2007b**). Unfortunately, many links between music preferences and individual–difference variables other than the Big Five dimensions of personality have yet to be replicated, and some of the observed associations are bound to be culture- and/or cohort-specific.

One finding that has been replicated in several studies is a positive association between musicianship and liking classical and jazz music, whether musicianship is defined as music training or the ability to play an instrument (**Colley 2008**; **George et al. 2007**; **Getz et al. 2014**). An interesting avenue for future research would be to examine whether associations between music preferences and music training—or any individual differences other than the Big Five personality dimensions—are nevertheless explained by personality. For example, because musically trained individuals also tend to be high in openness-to-experience (**Corrigall et al. 2013**), openness could explain, in part or in full, the association between music training and liking for classical and jazz music.

In sum, since 2000, research has revealed much about the kinds of people who like different genres of music. One issue that has been widely acknowledged in the field is the difficulty in choosing which genres to include in empirical research and which to exclude. For example, country music is popular in America but it has significantly fewer fans in other parts of the world. As noted, the genres that are included in any study appear to influence the underlying dimensional structure of music preferences, such that solutions from principal components analysis fail to be capable of more broad generalization. In unpublished research conducted in our own lab, we administered a version of the STOMP to approximately 2000 students registered in introductory psychology for several years in a row. The underlying factor structure differed from year to year and was never identical to that reported by **Rentfrow and Gosling (2003)**.

Although researchers must ensure that the genres included in measures of music preference comprise only those that are well known in the particular culture and age group being studied, in one instance, this approach did not accurately reflect the music preferences of almost one-third of a sample of Finnish university students (**Ferrer et al. 2013**). In other words, measures at the level of genre may not be precise enough to capture the subtleties of many listeners' preferences. Another problem is the lack of specificity in defining musical genres (e.g. what distinguishes a rock song from a pop song?), and the fact that many genres are likely to be conceptualized differently by different individuals. This issue is further complicated by the fact that genres evolve over time. Supposedly objective measures of genre such as those provided by iTunes are similarly inconsistent. For example, original studio albums by the group Radiohead are classified as "alternative," yet their greatest hits collection—comprising recordings from the same albums—is classified as "rock."

In a documentary film (**Dunn et al. 2005**) and a follow-up TV series (aptly named *Metal Evolution*; **Banger Films, Inc. 2011)**, anthropologist Sam Dunn mapped a "Heavy Metal Family Tree" that identified the origins of heavy metal and the progression of its subgenres **(p.270)** over 40 years. Dunn's analysis of a single genre shows why it is difficult to define broad and evolving categories of music that contain distinctive subgenres that change over the years. It also shows how even within a particular genre, people often have strong opinions about their liked and disliked subgenres. The non-musical social and cultural connotations associated with different genres, which also change over time, also influence music preferences. For example, rock music was associated with deviant behavior and delinquency many years ago, but it is now among the most mainstream genres in many places around the world. Finally, even within a preferred genre, some individual songs are liked better than others. It is also common to like a song that comes from a genre that one usually dislikes. In the next section, we examine what factors influence whether or not a listener will like a particular piece of music, and how such liking is associated with contextual factors and individual differences.

**Liking for individual musical pieces**

The study of liking individual pieces of music can include excerpts taken from a wide variety of genres or, alternatively, many different excerpts from a single genre. In either case, researchers can examine what factors influence liking responses while (1) minimizing the influence of extra-musical social and cultural connotations that are associated with different genres, and (2) reducing random variation that arises from individual differences in listeners' understanding of how genres differ according to their labels. The use of *unfamiliar* music excerpts rather than verbal labels or descriptions minimizes the effects of episodic memories that may be associated with familiar pieces.

**Liking and exposure**

Anecdotally, listeners often report that they do not like a piece of music initially, even though they may grow to like it after repeated listening. Indeed, frequency of exposure, or familiarity with a stimulus, has been known to influence liking ever since **Zajonc's (1968)** seminal research documenting the *mere exposure effect*. This refers to the fact that originally neutral stimuli (e.g. line drawings, Chinese characters) are liked better when the perceiver has encountered them previously, even when the perceiver cannot remember them explicitly. Early research provided evidence that the effect extended to excerpts of unfamiliar music, which are liked better if the perceiver has heard them before (**Brickman and D'Amato 1975**; **Heingartner and Hall 1974**; **Krugman 1943**; **Meyer 1903**; **Mull 1957**; **Obermiller 1985**; **Peretz et al. 1998**; **Wilson 1979**).

Nevertheless, people often complain that a particular song has been "overplayed." In other words, listeners can come to dislike a song that they have heard too frequently, especially over a short period of time. Consistent with these anecdotal observations, some theorists have proposed that liking varies as an inverted-U shaped function of novelty (**Berlyne 1970**; **Stang 1974**). Completely unfamiliar stimuli are potential threats and therefore somewhat disliked. With initial exposure that has no negative consequences, liking increases because the stimulus is more predictable and less of a threat. As exposure **(p.271)** increases further, however, the stimulus can become too predictable (i.e. boring), such that liking decreases. Early research provided evidence consistent with the proposal that overexposure to music decreases liking (**Bartlett 1973**; **Brentar et al. 1994**; **Getz 1966**; **Hargreaves 1984**; **Heyduk 1975**; **Verveer et al. 1933**).

In the real world, music listening occurs in a context. In a typical experimental setting, the listener is asked to attend closely to the music stimuli, usually while providing some kind of rating or judgment. Although everyday music listening can be equally focused, such as during a concert, it frequently occurs under more passive or incidental listening conditions. For example, music is often present in the background while people drive, shop, do housework, cook, surf the Internet, watch television, and exercise. In these contexts, attention is divided between music listening and the task at hand, and familiarity with the music may develop more slowly. As such, one important question is whether the effect of exposure on liking varies under different listening conditions.

To answer this question, **Szpunar and colleagues (2004, Experiment 2)** presented listeners with excerpts from concerti (i.e. orchestral music with a featured lead instrument) twice, eight times, or 32 times under one of two conditions. In the "focused" listening condition, participants actively attended to the excerpts because they were required to identify the lead instrument in each presentation. In the "incidental" listening condition, listeners listened closely to a narrated story presented in their right ear while the music excerpts were presented at a low volume in their left ear. The results revealed an inverted-U shaped function of liking as a consequence of exposure for focused listeners, with liking increasing from baseline (no previous exposure) up to eight presentations, and then decreasing down

to baseline levels with 32 exposures. By contrast, in the incidental listening condition there was a linear increase in liking as a function of exposure. These findings reveal that familiarity with a piece of music increases liking for it, up to the point at which it becomes too familiar. Such overfamiliarity occurs only, or at least more quickly, when listeners are attending closely to the music rather than overhearing it playing in the background.

Frequency of exposure may also affect liking differently across individuals, as a consequence of differences in personality or other variables. In one study, **Hunter and Schellenberg (2011a)** re-analysed the data from the focused listening conditions of two previously reported experiments (**Schellenberg et al. 2008**; **Szpunar et al. 2004**, Experiment 2). As a group, participants exhibited an inverted-U shaped pattern of liking as a function of exposure frequency, as reported in the original published articles. When participants were examined individually, however, less than half of them actually exhibited this pattern. The other participants exhibited monotonic increases, monotonic decreases, or an upright-U pattern of liking with increasing exposure.

To examine whether personality can explain such individual differences, **Hunter and Schellenberg (2011a)** replicated the findings from the focused-listening condition from **Szpunar and colleagues (2004, Experiment 2)**, but they also included a measure of the Big Five personality dimensions. Compared to individuals who were low in openness-to-experience, individuals who scored high in this dimension liked novel musical excerpts more and excerpts they had heard repeatedly less, showing particularly rapid satiation as **(p.272)** a function of exposure. Moreover, although the inverted-U shaped pattern for liking was common among listeners who scored low in openness, the most common pattern for listeners who scored high in openness was a monotonic decrease in liking with increasing exposure. This finding was expected because a hallmark of openness-to-experience is a preference for variety over routine. In sum, the effect of exposure on liking interacts with a variety of other factors including initial liking, the listening context, and personality.

Other factors that are likely to influence how quickly an individual will tire of hearing a particular song can be difficult to test in a laboratory setting. For example, we do not typically hear the same musical excerpt multiple times in one day, let alone in one hour, which can be the case in an experiment. One would expect it to take longer for listeners to dislike an overplayed song if the exposures were spread out over days or weeks compared to when they occur repeatedly in a short time frame.

Another factor that interacts with the effect of exposure on liking is how much the excerpt of music is liked initially. Repeatedly playing a song that a listener dislikes strongly is unlikely to shift such displeasure in a positive direction. In one study, listeners heard 12 excerpts of unfamiliar orchestral music six times each (**Witvliet and Vrana 2007**). They rated how much they liked each piece after they heard it the first time, and again after they heard it the sixth time. The 12 pieces were pre-selected so that half sounded pleasant (i.e. with positive valence) and the other half sounded unpleasant (negative valence). As in many other studies (e.g. Hunter et al. **2008**, **2010**, **2011a**, **2011b**; **Husain et al. 2002**; **Khalfa et al. 2008**; **Ladinig and Schellenberg 2012**; **Schellenberg et al. 2008**; **Thompson et al. 2001**; **Vieillard et al. 2008**), these adult listeners initially preferred positively valenced over negatively valenced music. After repeated exposure to both types of music, however, responses became more polarized. Positively valenced excerpts were liked even more, but negatively valenced excerpts were liked even less. It is unknown whether liking for the unpleasant-sounding music increased initially (i.e. between the first and sixth exposures) before it began to decrease.

## Liking and complexity

The idea that music liking peaks after a *moderate* number of exposures raises the possibility that moderation in general may be fundamental to liking. **Berlyne (1970)** also proposed that liking should exhibit an inverted-U shaped function according to complexity. In the case of music, it will be liked most when its melodic, rhythmic, and metrical structures are not too simple, predictable, and uniform, nor too surprising, unpredictable, and erratic. Using piano pieces composed specifically for experimental purposes, **Heyduk (1975)** found evidence consistent with this view. His participants preferred pieces that exhibited moderate levels of complexity (i.e. those that made use of a moderate number of different chords and a moderate amount of rhythmic syncopation) over pieces that were either too simple or too complex. These results have also been replicated with more ecologically valid stimuli. For example, when listeners were asked to rate unfamiliar excerpts of new age and house music in terms of liking and subjective complexity, they showed a similar preference for excerpts with moderate complexity (**North and Hargreaves 1995**).

**(p.273)** Nevertheless, the effect of complexity on liking may not be uniform across all genres of music. For example, **Orr and Ohlsson (2001)** presented listeners with jazz and bluegrass improvisations that were created by professional musicians to vary in complexity. For bluegrass excerpts, listeners exhibited a clear preference for a moderate level of complexity. For jazz excerpts, however, they preferred simplicity. It is possible that the inclusion of even simpler jazz improvisations may have revealed increases followed by decreases in liking as complexity increased. It is also possible that the effect of complexity on liking differs across genres, or that other factors such as initial liking or general familiarity with a genre interact with the effect of complexity on liking.

Moreover, complexity may not influence liking for all music listeners. **Orr and Ohlsson (2005)** found that the effect of musical complexity on liking was weaker or nonexistent among professional and amateur musicians compared to individuals with no music training. The authors suggested that musically trained individuals use a different set of criteria in their aesthetic judgments compared to other people, placing less importance on complexity. There is also some evidence that preferences for simple or complex music are affected by situational factors. For example, in one study, listeners preferred to hear simple music in the background while they performed a difficult sensorimotor task, but they preferred complex music while they performed a simple task (**Arkes et al. 1986**). Thus, the preferred level of musical complexity may vary with an individual's attentional capacity to process the music at a given point in time.

## Liking and feelings

One of the most common reasons that people give for listening to music is because of the way that it makes them feel, or because it can change how they are currently feeling (**Juslin and Laukka 2004**; **Lonsdale and North 2011**). In other words, emotional responding on the evaluative level can be influenced by responding on the feeling level. When **Juslin and Laukka (2004)** analysed listeners' free responses to the question "why do you listen to music?" the most common response (47 per cent) was "to express, release, and influence emotions", followed by other emotion and liking-related reasons such as "to relax and settle down", "because it makes me feel good", "because I like/love music", and "to get energized". Other research confirms that people particularly enjoy music that evokes intense feelings (**Ladinig and Schellenberg 2012**; **Schellenberg et al. 2012**).

One especially strong positive response to music is the physical sensation of *chills* (or *thrills*; **Goldstein 1980**). Chills are described as shivers down the spine, or a tingling sensation that is usually

felt at the back of the neck and often accompanied by goosebumps. In the first study to describe these kinds of physical responses to music, approximately half the participants reported experiencing music-induced chills (**Goldstein 1980**). Subsequent research revealed that individuals who are high in openness-to-experience tend to experience chills more frequently than other individuals (**McCrae 2007**; **Nusbaum and Silvia 2011**; **Silvia and Nusbaum 2011**). Although chills can also occur in response to other stimuli, including visual art, tactile stimulation (think of a feather tickling the back of your neck), and even fantasies or memories, chills elicited by music tend to be experienced as **(p.274)** particularly pleasant (**Goldstein 1980**; **Grewe et al. 2011**; **Panksepp 1995**). There is also some evidence that individuals tend to experience chills in response to unexpected or surprising musical events, such as an unexpected harmony or a sudden change in volume or orchestral texture (e.g. **Grewe et al. 2007**; **Guhn et al. 2007**; **Panksepp 1995**; **Sloboda 1991**).

Because chills are indicative of peak emotional experiences, pieces that elicit chills tend to be accompanied by higher ratings of the intensity of the listener's emotional response, faster heart rate, and a more intense skin conductance response (**Grewe et al. 2009**). Chills also tend to occur more frequently in response to emotionally expressive music compared to relaxing or arousing music that is less emotionally expressive (**Rickard 2004**). Chills most often occur in response to familiar and well-liked music (**Grewe et al. 2009**), possibly because familiar music is more likely than unfamiliar music to induce powerful emotions.

Consistent with the view that chills represent particularly emotional experiences, several studies have shown that that music-induced chills are associated with physiological arousal (e.g. **Craig 2005**; **Grewe et al. 2011**, **2009**; **Guhn et al. 2007**; **Rickard 2004**; **Salimpoor et al. 2011**, **2009**) as well as with activation in brain areas that are involved in reward and emotion processing (e.g. **Blood and Zatorre 2001**; **Salimpoor et al. 2011**). In fact, participants' subjective ratings of the intensity of the chill response are correlated with the amount of dopamine released in the nucleus accumbens, also known as the brain's pleasure center (**Salimpoor et al. 2011**). In short, results from behavioral, physiological, and neuroimaging studies confirm that chills are particularly strong, positive emotional experiences to well-liked music, and, conversely, that well-liked music often tends to be music that influences how the listener feels.

**Liking and specific feelings**
Listeners tend to experience positive emotions more frequently than negative emotions in response to music (e.g. **Gabrielsson 2001**; **Juslin and Laukka 2004**; **Juslin et al. 2008**), and they generally prefer music that expresses positive emotions such as happiness over music that expresses negative emotions such as sadness (e.g. **Hunter et al. 2008**, **2010**, **2011a**, **b**; **Husain et al. 2002**; **Khalfa et al. 2008**; **Ladinig and Schellenberg 2012**; **Schellenberg et al. 2008**; **Thompson et al. 2001**; **Vieillard et al. 2008**). This preference for music that is positive in valence is evident even among individuals who have experienced damage to the emotion-processing centers of the brain, including the amygdala (**Gosselin et al. 2005**). Thus, the elicitation of positive emotions appears to be central to the universal appeal of music. At the same time, we know that people often listen to sad-sounding music. But why would people choose to listen to sad-sounding music? And when in development does the preference for happy-sounding music emerge?

In one developmental study, adults and 5-, 8-, and 11-year-old children were asked to rate how much they liked short excerpts of music (**Hunter et al. 2011b**). The excerpts were chosen to sound unequivocally happy, sad, scary, or peaceful. These particular emotions vary on two dimensions that

are relevant to emotion research: arousal and valence (**Russell 1980**). Arousal refers to activation or energy level, whereas valence refers to pleasantness. Happiness has high arousal and positive valence, sadness has low arousal and negative **(p.275)** valence, fear has high arousal and negative valence, and peacefulness has low arousal and positive valence. Adults showed a preference for excerpts with positive valence (happiness and peacefulness), but arousal did not influence their liking ratings. By contrast, children of all ages had elevated levels of liking for excerpts that expressed high-arousal emotions (happiness and fear), but valence did not matter. Because musical tempo (fast or slow) is associated with arousal, whereas mode (major or minor) is associated with valence (**Husain et al. 2002**), these results point to a basic preference for faster music in childhood, which turns into a preference for major-key music in adulthood. Other findings from the same study revealed a preference for music with positive valence among female listeners, which is likely to be related to the female preference for Top 40 music discussed earlier (**Colley 2008**).

The children and adults in the study by **Hunter and colleagues (2011b)** were also asked to identify which of the four emotions each excerpt conveyed. Young girls were better than young boys at this task, but both genders performed as well as adults by the time they reached 11 years of age. Among children of all ages, individual differences in identification accuracy were associated with liking. Greater accuracy predicted higher levels of liking for positively valenced music among the 5- and 8-year-olds, but lower levels for the 11-year-olds. In other words, as 11-year-olds became more accurate at identifying music as happy-, sad-, scary-, or peaceful-sounding, they also tended to dislike music that sounds happy or peaceful; that is, music their parents (particularly their mothers) like.

The phenomenon of liking sad-sounding music, which has been documented empirically (**Garrido and Schubert 2011**; **Kawakami et al. 2013**; **Kreutz et al. 2008**; **Vuoskoski and Eerola 2012**; **Vuoskoski et al. 2012**; **Zentner et al. 2008**), is particularly interesting for psychologists because it demonstrates that music that expresses a negative feeling can nevertheless be evaluated positively. In fact, although sad-sounding music may be perceived to sound tragic, it can simultaneously decrease tragic feelings but increase romantic and blithe feelings (**Kawakami et al. 2013**). But when, where, and why do individuals enjoy listening to music that expresses a negative emotion?

One factor that matters is the emotional character of previously heard songs. **Schellenberg and colleagues (2012)** collected emotion intensity and liking ratings of excerpts of classical piano music that expressed happiness or sadness unambiguously. Happy-sounding excerpts were in a major key with a fast tempo. Sad-sounding excerpts were minor and slow. For each participant, one of these emotions was designated as the "background" emotion and the other as the "contrasting" emotion. Excerpts that expressed the contrasting emotion were presented after a varying number of different excerpts that expressed the background emotion. For example, some of the listeners heard a happy-sounding excerpt after hearing one, two, four, or eight different excerpts that sounded sad; others heard a sad-sounding excerpt after hearing one, two, four, or eight different excerpts that sounded happy. As the presentation frequency of the background emotion increased, emotion intensity and liking ratings decreased, such that there was greater appreciation and more intense emotional responding for excerpts that conveyed the contrasting emotion. In other words, sad-sounding music is appreciated more after listeners have been **(p.276)** inundated with happy-sounding music (and vice versa) because it represents a change from emotional monotony.

Other research suggests that sad-sounding music may be liked more after listeners are fatigued or in a negative mood. **Schellenberg and colleagues (2008)** collected liking ratings of musical excerpts that

expressed happiness or sadness after they had been heard 0, 2, 8, or 32 times previously. Half the participants heard the music in a focused-listening condition, which required them to identify whether each excerpt expressed happiness or sadness. The other half—incidental listeners—completed the same task used by **Szpunar and colleagues (2004)** while the music was presented softly in the background. Specifically, they heard a narrated story in their right ear and were required to press one button every time they heard the word "and", another button every time they heard the word "the", and to count the number of times they heard the word "but". In their left ear, the happy- and sad-sounding excerpts were presented audibly but very quietly. Exposure frequency had the usual effect on liking. For focused listeners, liking first increased but then decreased as the number of exposures increased. For incidental listeners, liking increased linearly for excerpts heard more frequently. But there was also an interaction between listening condition and emotion that was independent of number of exposures. Focused listeners exhibited the typical bias, liking happy-sounding more than sad-sounding excerpts. For incidental listeners, however, sad-sounding excerpts were liked just as much as happy-sounding excerpts. Importantly, this difference was driven by greater liking for sad-sounding pieces in the incidental compared to the focused listening condition.

Why was sad-sounding music liked more for some listeners? **Schellenberg and colleagues (2008)** suggested that the difficult and attention-demanding task for incidental listeners may have affected their emotional state negatively. After completing the task, participants may have been fatigued or even slightly agitated, such that they found the sad music to be calming. Alternatively, participants may have displayed a mood-congruency effect, preferring negatively valenced music because it matched their negative mood. To test the second hypothesis, **Hunter and colleagues (2011a)** induced a sad, neutral, or happy mood in participants by asking them to rate and describe how different pictures (e.g. a birthday party for happy, a building for neutral, an injured animal for sad) made them feel. Participants were subsequently presented with either a happy- or sad-sounding excerpt (**Hunter et al. 2011a**, Experiment 1) and asked to judge how much they liked it. The results revealed that although the typical preference for happy-sounding music was present after a happy or neutral mood was induced, it disappeared when listeners were in a sad mood. Sad listeners liked happy- and sad-sounding excerpts equally. In a second experiment, sad moods were found to increase the perception of sadness in neutral-sounding music. These findings extended the results of the study by **Schellenberg and his team (2008)** by showing that mood congruency influences what music people like and their perception of emotion in music. In short, the expression *misery loves company* extends to music listening.

But why are people more inclined to appreciate sad music when they are in a sad mood? Is it because they prefer to listen to music that expresses their current feelings, or is it because they feel that listening to mood-incongruent (i.e. happy) music would be **(p.277)** inappropriate or ineffective at lifting their mood? **Friedman and colleagues (2012, Experiment 3)** explored participants' motivations for listening to music that expressed different emotions after inducing a happy, neutral, or sad mood. Participants first generated a short list of their favorite happy and sad songs. After watching a film clip for the purposes of mood induction, they were then asked to rate: (1) their desire to listen to happy- or sad-sounding songs, (2) how listening to happy or sad songs would make them feel, and (3) how appropriate it would be to listen to happy or sad songs. The results revealed that participants who were in a happy mood were averse to listening to sad-sounding music, and participants who were in a sad mood were averse to listening to happy music (the neutral group was not averse to either). Participants in a happy mood believed that listening to sad songs would worsen their mood, whereas those in a sad

mood reported that listening to happy-sounding music would feel inappropriate or wrong, which would, presumably, counteract any emotion-contagion effects of happy music. In some instances, then, an appreciation for sad-sounding music while in a sad mood is better described as an aversion to happy-sounding music.

Other studies have examined whether individual differences based on personality or musical expertise help to explain why some people like to listen to sad-sounding music. In one study, **Ladinig and Schellenberg (2012)** presented listeners with unfamiliar excerpts of music taken from a wide variety of genres. The excerpts varied in tempo (fast or slow) and mode (major or minor), such that half were obviously happy- or sad-sounding (fast-major or slow-minor, respectively), and half contained mixed cues to happiness and sadness (fast-minor or slow-major). Participants first completed a background questionnaire that assessed their scores on the Big Five personality traits and how much music training they had received. They then listened to each excerpt and rated how much they liked it, how intense their emotional response was, and which emotion(s) they felt. Liking for music that conveyed happiness did not differ from individual to individual. By contrast, liking for music that conveyed sadness or mixed happiness and sadness was influenced by personality and music training. Individuals who had a stronger appreciation for sad-sounding music tended to score low on extroversion (or high on introversion) and high on openness-to-experience, whereas individuals who enjoyed music with mixed cues to emotion tended to have more music training.

Future research could examine whether introverts like sad-sounding music because of its slow tempo. We know that tempo is associated with the arousal dimension of emotion (**Husain et al. 2002**), and that introverts tend to avoid excitement and activity (**McCrae and Costa 1987**), possibly because their optimal level of arousal is relatively low (**Eysenck 1981**). Introverts also tend to experience positive emotions less frequently than extroverts (**Matthews et al. 1990**), which may explain their greater appreciation for sad-sounding music. As for individuals who are high in openness-to-experience, their aesthetic sensitivity and preference for variety (**Costa and McCrae 1992**) may explain why they like sad-sounding music. More specifically, these individuals may be more likely to perceive the beauty of music that expresses sadness and emotions other than happiness. Finally, **Ladinig and Schellenberg (2012)** suggested that musically trained individuals have **(p.278)** a propensity for enjoying music with mixed cues to emotion because they are more sophisticated listeners. In other words, musically trained individuals may be more likely to perceive nuanced and subtle emotions in music with mixed cues, leading them to appreciate it for its emotional complexity, even though they may not care much about musical complexity (**Orr and Ohlsson 2005**). Other reports substantiate the association between openness-to-experience and liking sad-sounding music (**Vuoskoski and Eerola 2011**; **Vuoskoski et al. 2012**), and show additionally that empathy is associated positively with experiencing intense emotions in response to music and with enjoying sad-sounding pieces (**Vuoskoski et al. 2012**). Formal hypotheses about *why* particular groups of individuals are more likely than others to appreciate sad-sounding music have yet to be developed or tested empirically.

At a more macro level, there is evidence that among the American music-buying population, liking sad-sounding and emotionally ambiguous music has become more common over the years. When **Hunter and colleagues (2008)** were choosing their stimulus excerpts, they were surprised to discover that it was relatively difficult to find recent recordings that were clearly happy sounding (fast tempo and major mode). To examine whether there has been a shift away from unambiguously happy-sounding music over the past five decades, **Schellenberg and von Scheve (2012)** analysed several musical characteristics (e.g. tempo, mode, duration) from over 1000 songs that reached the Top 40 between

1965 and 2009. In line with their hypothesis, they documented that the use of the minor mode doubled during that time, and that popular recordings became slower in tempo and longer in duration. Moreover, mean tempo decreased over time more for songs that were composed in major keys compared to songs in minor keys, pointing to a more frequent use of relatively slow tempi in music composed in major keys, but relatively fast tempi in music composed in minor keys. In short, popular music has moved away from the primarily happy-sounding songs of the 1960s, with increasing use of musical cues to sadness (slow tempo or minor mode) and emotional ambiguity (slow tempo and major mode, fast tempo and minor mode). Even when looking beyond the level of the individual or listening context, liking for clearly happy-sounding music has decreased over the past five decades in American society as a whole.

**Future directions**

Research on music preferences is in its infancy and many questions remain unanswered. **Rentfrow and McDonald (2010)** provided a thorough review of issues in the field that have yet to be resolved, and they proposed new avenues for future research. One major limitation of the current body of work is that it focuses almost exclusively on older adolescents and young adults. Although there is some evidence that music preferences crystallize between 20 and 30 years of age (**Holbrook and Schindler 1989**), it is important to study how music preferences change, if at all, in middle and late adulthood, and to examine how preferences develop in the first place during infancy, childhood, and adolescence. A related issue concerns the stability of music preferences over the life span. In the present review, **(p. 279)** only one study examined liking music among child participants, using a cross-sectional approach (**Hunter et al. 2011b**). Although a few studies have examined this issue longitudinally over a few years (e.g. approximately 2–3 years; **Delsing et al. 2008**; **Mulder et al. 2010**), studies of longer duration could reveal more about whether preferences change or stay the same, especially at important transitional periods in the lifespan (e.g. from childhood to adolescence and from adolescence to adulthood). Studying music liking from a developmental perspective could provide additional insight into why music is such an important part of people's lives.

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